

### **REMARKS**

By this Amendment, the claims are amended to merely clarify the recited subject matter by further defining a sequence of images and the mean luminance of pixels. Claims 2 and 8 are cancelled without prejudice or disclaimer. Claims 1, 3-7 and 9-10 are pending.

Claims 1-10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Kalker et al. (US Pub. 2004/0250079; hereafter “Kalker”) in view of Haitsma et al. (US 6,477,431; hereafter “Haitsma”). Applicant traverses the rejection of the remaining pending claims because the cited prior art, analyzed individually or in combination, fails to teach or suggest all the features recited in the rejected claims. For example, the cited prior art fails to teach or suggest the claimed invention including

- the claimed method of claim 1, including “modifying an image in accordance with a watermark sample from the sequence of watermark samples, the modification comprising **adding the watermark sample value to the luminance value of pixels of the first image area and subtracting the watermark sample value from the luminance value of pixels of the second image area to oppositely modify the mean luminances of the first and second image areas in accordance with the watermark sample**; and for each of the sequence of watermark samples, repeating the dividing an image of the sequence of images and modifying of the image in accordance with a watermark sample from the sequence of watermark samples **such that each watermark sample oppositely modifies the mean luminances of the first and second image areas of a different image of the sequence of images until the entire watermark is embedded;**”
- the claimed arrangement of claim 6, including “image modifying means being arranged for modifying the image in accordance with a watermark sample from the sequence of watermark samples, the modification comprising **adding the watermark sample value to the luminance value of pixels of the first image area and subtracting the watermark sample value from the luminance value of pixels of the second image area to oppositely modify the mean luminances of the first and second image areas in accordance with the watermark sample**, wherein, the modifying means is further arranged to repeat the dividing an image of the sequence of images and modifying of the image for each of the sequence of watermark samples in accordance with a watermark sample from the sequence of watermark samples **such that each watermark sample oppositely modifies the mean luminances of the first and second image areas of a different image of the sequence of images until the entire watermark is embedded;**” and

- the claimed method of claim 7, including “dividing each image of the host signal into at least a first and a second image area; **determining a mean luminance of the first and the second image area; computing the difference between the mean luminance of the first and the second image area; and correlating the corresponding sequence of differences with the watermark to be detected.**”

According to the invention, a single bit is embedded into a single image; however, to the contrary, Kalker merely discloses modulation of a global property of a frame in a HDTV-video signal whereby a watermark is embedded by modulating the property of the sequence of frames by the watermark. Kalker discloses that this property can be luminance or a histogram or features derived therefrom, i.e., features from the image itself. However, Kalker’s method of modulating image frames in a temporal sequence is performed in a global manner. As a result, Kalker’s method is prone to “de-flicker” operations that are often used to remove flicker, which results from the different frame rates of cinema projection equipment and consumer camcorders; flicker can cause a watermark to become invisible or undetectable.

However, as explained previously by the Applicant, Kalker makes no mention of dividing an image into a plurality of areas or modification of an image to increase the global property of the first area and decrease the global property of the second area for embedding the first value of a watermark sample into the image or vice versa.

In Kalker, each sample of the watermark modifies an entire image or, in other words, only a single watermark sample is embedded into a single image. The claimed opposing modification of the pixels in the first and second areas of the image to modify the mean luminance of the respective image areas however is not disclosed nor suggested in Kalker.

The Office Action asserted that the claimed invention was obvious in view of Kalker and Haitsma. However, the present invention must be recognized as a further improvement of Kalker. Thus, the Office Action appears to be relying on Haitsma to remedy the deficiencies of Kalker.

In Haitsma, watermark detection is performed by computing the correlation of a suspect information signal with an applied watermark pattern and comparing that correlation with a pre-determined threshold. If the correlation is larger than the threshold, the watermark is considered to be present, otherwise it is considered to be absent. Haitsma discloses to that end embedding a watermark into an information signal (an image, see abstract) by subdividing the images into a plurality of tiles and modifies each tile by embedding the watermark in each tile and spatially

shifting the tile over a sector (see, column 2, lines 47-59). In respect of embedding a watermark, there is no teaching regarding the modification of an image to increase the mean luminance of a first area and decrease the mean luminance of a second area to embed the first value of a watermark sample into the image or vice versa. Also in respect of detecting a watermark, Haitsma does not teach determining a mean luminance of the first and the second image area; computing the difference between the mean luminance of the first and the second image area; forming a sequence of the computed differences corresponding to the sequence of images; and correlating the corresponding sequence of differences with the watermark to be detected. Applicant notes that Haitsma does teach on the subject of manipulation or adjustment of mean luminance at all.

The Office Action also asserted that Haitsma teaches a global depth parameter,  $d$ , which provides global scaling of the watermark. However, Applicant has amended the claimed invention to clarify how the mean luminance is added and subtracted and distinguish the teachings of Haitsma.

Moreover, one of ordinary skill in the art would not have looked to Haitsma to modify or improve on Kalker because, in Haitsma, an entire watermark is embedded into each subdivision of a subdivided frame. That is, the mere subdivision of an image into different parts as disclosed in Haitsma does not suggest oppositely encoding a single sample into such an image. Furthermore, Haitsma's subdivision of an image into different parts does not result in the effect that the mean luminance of the entire pixel remains essentially the same. In fact, even if one were to embed a single bit into an image according to Haitsma, the problem identified in Kalker's paragraph [0006] is not resolved. More specifically, such an embedding of a single bit into an image will not stop an embedded watermark from being removed when flicker between consagative images is removed by a de-flicker tool.

Thus, modifying the teachings of Kalker based on the teachings of Haitsma would not provide the claimed invention, in particular, the modification of an image to increase the global property of a first area of the image and decrease the global property of a second area of the image to embed the first value of a watermark sample into the image (or vice versa). Accordingly, the Office Action has failed to establish a prima facie case of obviousness and the rejection is traversed.

For all of the above reasons, withdrawal of the rejection of pending claims is respectfully requested. In view of the above, it is submitted that all of the pending claims are in condition for allowance and such action is respectfully requested.

If there is any issue remaining to be resolved, the examiner is invited to telephone the undersigned at (202) 371-6371 so that resolution can be promptly effected.

It is requested that, if necessary to effect a timely response, this paper be considered a Petition for an Extension of Time sufficient to effect a timely response with the fee for such extensions and shortages in other fees, being charged, or any overpayment in fees being credited, to the Account of Barnes & Thornburg LLP, Deposit Account No. **02-1010** (48588-47163).

Respectfully submitted,

BARNES & THORNBURG LLP

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